

LAST STARFIGHTER

Design Specification and Project Initiation Data

By C. J. Horseman

With Additional Ideas from Jim Morris and Barry Whitebook

Illustrated by Barry Whitebook

## LAST STARFIGHTER

### Summary of Story

An alien entrepreneur has placed STARFIGHTER games machines on Earth as a test for prospective Starfighters. Although STARFIGHTER appears to be just another arcade game, it contacts the alien when the high score record is broken.

Alex, a 19-year old who lives in a trailer park, is an ace at STARFIGHTER and gets whisked off to the planet RYLOS as a draftee to combat the evil XUR and the KO-DAN armada. Having been fooled into coming, Alex refuses and is returned to Earth. While Alex is gone from RYLOS, a KO-DAN attack destroys all the GUNSTAR ships (STARFIGHTERS) and crews, except for a prototype equipped with a special weapons system called DEATH BLOSSOM.

Alex, meanwhile, changes his mind and, with the help of the alien, returns to RYLOS where, with Navigator/Pilot GRIGG, he takes off in the last GUNSTAR to take on the whole enemy fleet. Fighting through a series of space battles, Alex and GRIGG succeed in saving the universe and then return to Earth to pick up Alex' girlfriend before assuming the role of commander of RYLOS armed forces and being given the hero treatment on RYLOS.

The story is corny and funny in places, but has good potential...especially if the FX and Digital productions material are as good as expected.

The game of LAST STARFIGHTER uses a combination of ideas from the game in the film and the "real" battle sequences.

## LAST STARFIGHTER

### Design Specification and Project Initiation Data

#### 1. STORYLINE

Trainer for space fighter gunner. Takes you through a series of possible combat situations/possible enemy ships encountered. Tied in with Last Starfighter film. (See script.)

#### 2. BASIC GAMEPLAY

##### General

Player controls weapons on GUNSTAR and orientation of GUNSTAR chair; he is not piloting ship.

Player's head-up display shows information on weapons system and coolant (shields), as well as on currently targeted enemy, surrounding enemy positions and GUNSTAR chair orientation. Not all information is available in each round.

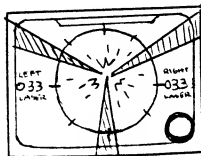
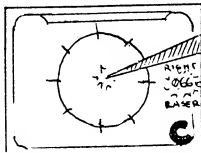
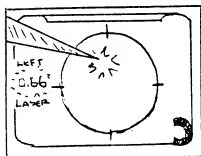
Each of the enemy ships takes a different amount of energy to destroy. Enemy condition is shown by the "Target temperature gauge." When the enemy temperature hits max, it will explode. The rate at which the gauge rises is determined by the type of ship. Temperature rises while player's lasers are contacting enemy ship and may fall if this ceases before destruction.

The condition of the GUNSTAR is shown by the "Hull temperature gauge." When the GUNSTAR is being "hit" by enemy fire, the hull temperature increases. When the hull temperature gets high, coolant flows in (around the gauge on screen from the on-screen reservoir) to cool the hull. This depletes the

reservoir of coolant. If no coolant remains, the hull temperature will reach maximum and the GUNSTAR is destroyed. A coolant recharge is given at the end of a complete round.

### Lasers

Player's laser energy is shown for each side laser. Laser energy decreases with time of laser use and increases far more slowly. This encourages short bursts of fire from one laser at a time. If both lasers are fired simultaneously, a third laser also fires from below without additional depletion of energy, but with additional effect on the target. This contradictively encourages use of both lasers simultaneously. As players increase in skill, they will learn to use short, single laser bursts on small targets and twin laser bursts on large targets. This combination will ensure best energy usage and maximum destructive effect. It is possible for a player to be stranded with inadequate energy and be destroyed because of insufficient ability to retaliate, but this cannot happen on beginner rounds where energy drain is very low.

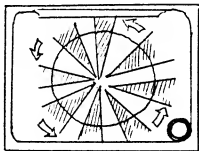


Death Blossom (May rename this laser blossom as less offensive.)

This is fired with rear buttons on Star Wars controller. The central circle will "light up" on screen to show when death blossom is charged and useable. Activation causes the screen to be blanketed with laser fire destroying (or greatly heating up if mother ship) all targets on screen.

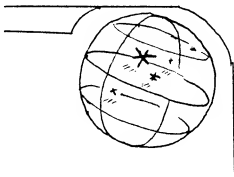
Visual effect is of multiple lines from all around edge of sensor, each drawing to center, then all revolving with color swirl effect; i.e.,

- Does not destroy - Control Tower (BONUS)
- XUR's Transport (BONUS)



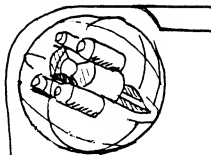
Enemy Position Globe

This indicator is present only in the asteroid. It shows the GUNSTAR position within the asteroid, and the proximity of enemy craft. It will flash as a visual warning of enemy in rear. This will be accompanied by a verbal warning to the same effect. Enemy craft close to ship will show brightly to give the display depth.



#### GUNSTAR Orientation Indicator

This instrument is used and displayed only during the asteroid sequence and shows the orientation of the GUNSTAR relative to the player's viewpoint. This also adds symetrically to the display and visually balances the enemy position globe above.



#### Explosions

Enemy ships melt into plasma balls that then explodes globules across screen with teardrop effect as if of a viscous liquid. Amount depends on ship size and distance. Plasma will be intense colors, cooling to edges of screen. Explosions of bigger ships will be multiple, as in a film explosion, retaining a "plasma" core until the final (and largest) explosion.

#### Scoring (to be revised)

Ships destroyed increases score by ship value, multiplied by a distance bonus; i.e., if an expert can hit a ship while distant, he will receive more points than a novice who hits it when close. (More to come later.) First wave bonus; successive wave bonuses. Majority of round score is for completion.

Hitting two ships at once scores 4\* single ship value. Each round ship score increases.

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## MAXIMUM SCORES FOR ROUNDS (GUESSTIMATES)

<u>Round</u>	<u>Maximum Possible Score</u>	<u>Difficulty Relative to 0</u>
0	N	1
1	2N	2
2	3N	3
3	4N	4
4	5N	5
5	6N	6
6	8N	8
7	9N	9
8	10N	10
9	12N	12
10	12N	13
11	12N	15
12	13N	17
13	13N	19
14	14N	22
15	15N	25
16	16N	28
17	20N	35
18	40N	100 (impossible to complete)

### 3. CHARACTER DESCRIPTION

The main characters are the different types of enemy spaceships.

These vary in their weaponry and the way in which they react.

Ships are:

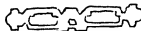
1 - KO-DAN INVASION SHIP



2 - KO-DAN DECK FIGHTER



3 - KO-DAN CONTROL SHIP (BOOMERANG)



4 - XUR's TRANSPORT



5 - DRONE PRACTICE TARGETS



LAST STARFIGHTER

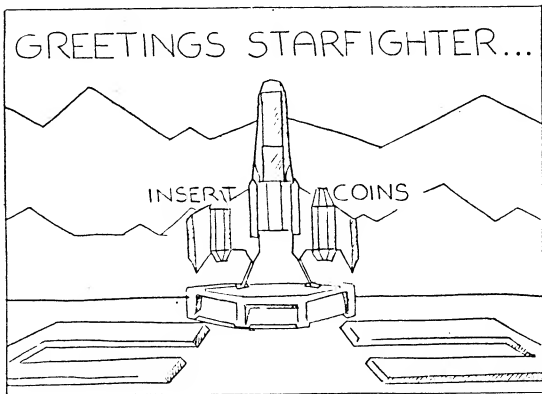
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Characteristics of Ships

1. Medium speed--medium firepower--medium maneuverability
2. Fast speed--high firepower--high maneuverability
3. Slow speed--very high firepower--low maneuverability
4. Very fast speed--low/no firepower--high maneuverability
5. Slow to very fast speed--no firepower--low to high maneuverability

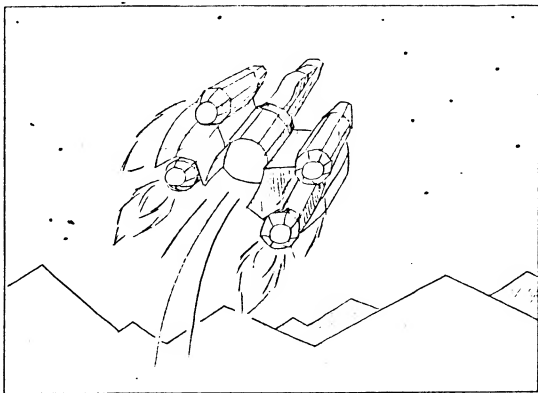
4. INTRODUCTION SEQUENCE



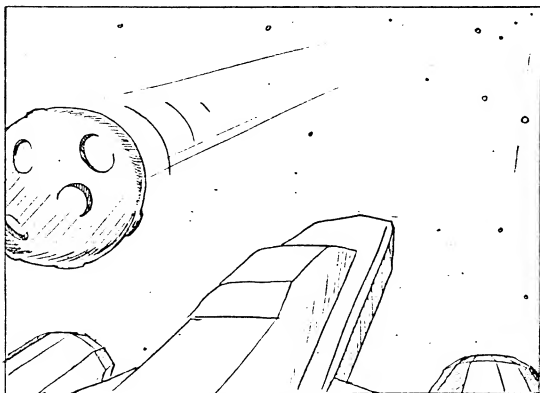
attract screen

Alternates with some brief play sequences. Coin drops, then ship blasts off.

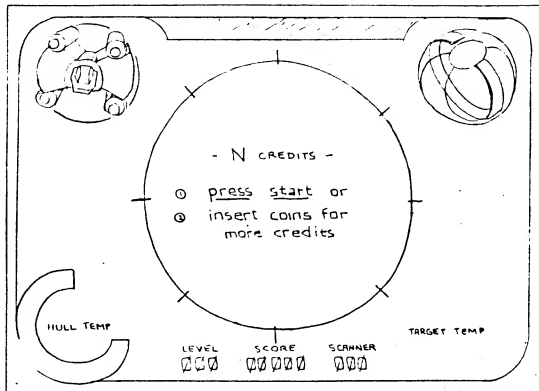




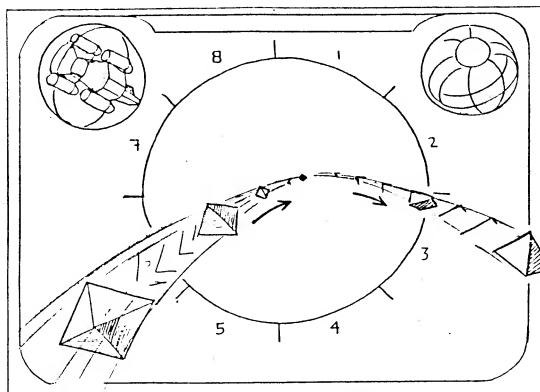
coin goes in, ship blasts off



into space



Message screen appears. Player pushes START and goes into level selection round.



game start ... target light arcs across screen

Level Select (Target Practice)

This appears to the player as the final wave of the game, but in reality determines the level at which he starts and thus his first wave bonus, which is a highly significant amount.

Story Line

Drone targets are launched from back of ship. They fire across vision with varying speed and movement.

Target Drones



1 - Ball  
Large



2 - Pyramid  
Medium



3 - Cube  
Small

Six sets of drones are launched:

- (a) one of Drone 1 - Low Speed - Straight line
- (b) one of Drone 2 - Medium Speed - Simple arc
- (c) one of Drone 3 - Higher Speed - Multiple arcs
- (d) two of Drone 1 - Medium Speed - Straight lines
- (e) two of Drone 2 - Higher Speed - Simple arcs
- (f) three of Drone 3 - Highest Speed - Multiple arcs

Level Computation

<u>Score (Drones)</u>	<u>Level</u>
0	Beginner (0)
1	Beginner (0)
2	Beginner (0)
3	Intermediate (2)
4	Intermediate (2)
5	Intermediate (2)
6	Advanced (4)
7	Advanced (4)
8	Advanced (4)
9	Expert (6)
10	Expert (6)

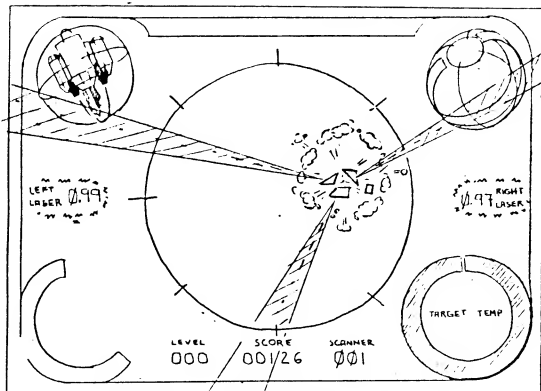
Entry Round Bonuses

<u>Round</u>	<u>Bonus</u>
0	0
1	Maximum score for round 0 + 50%
2	Maximum score for round 0 + 1 + 50% round 1 max.
3	Maximum score for 0, +1, +2 + 50% of 2
4	Maximum score for 0, +1, +2, +3 + 50% of 3
5	Maximum score for 0, +1, +2, +3, +4 + 50% of 4
6	Maximum score for 0, +1, +2, +3, +4, +5 + 50% of 5

# LAST STARFIGHTER

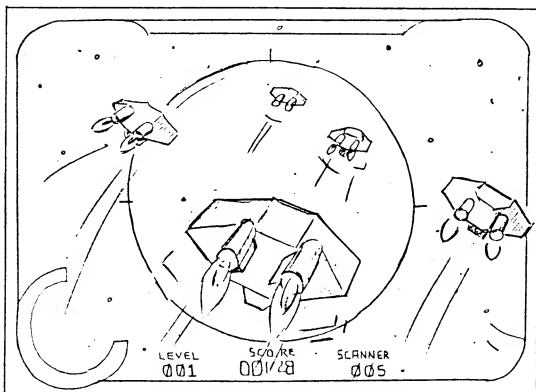
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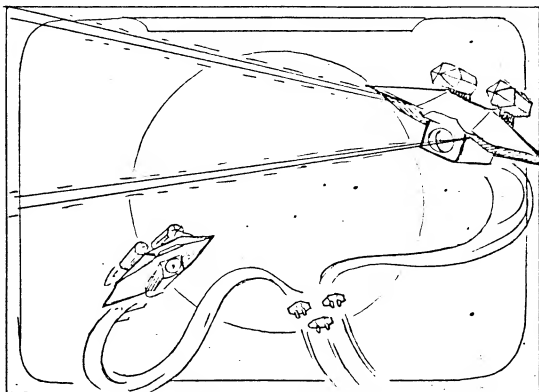
destroy drones for merit select

Then enter Round 1.



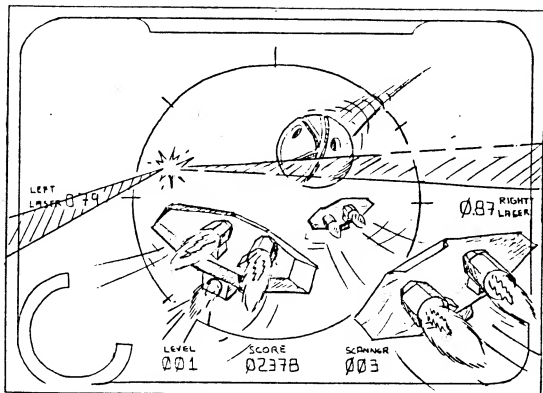
xurian fighters appear

Xurian fighters appear. You have a brief chance to attack from behind before some ships turn and fight. Enemy ships stay in formation, turning together as they fire.



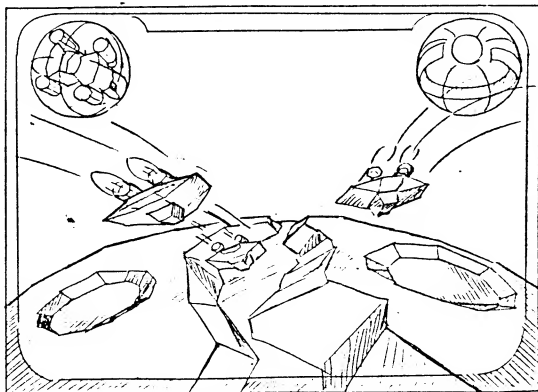
some turn and fight

Rate of fire, number of ships and their speed are round dependent. Ships will come at you, then do a fighter-style rollout to avoid you. Then any remaining (at least 2 or 3) head towards asteroid.



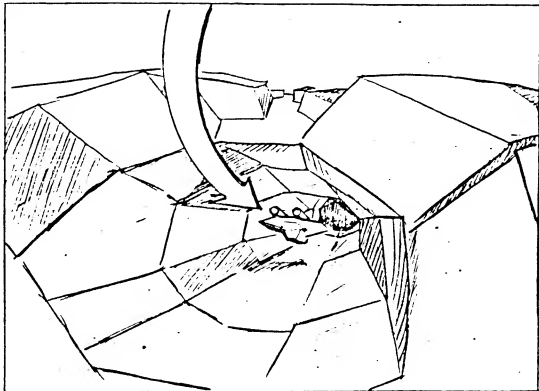
xurian fighters streak towards asteroid

Your ship follows to asteroid. (You can still fire.)



you pursue fighters

Then into a cave.



down into the cave

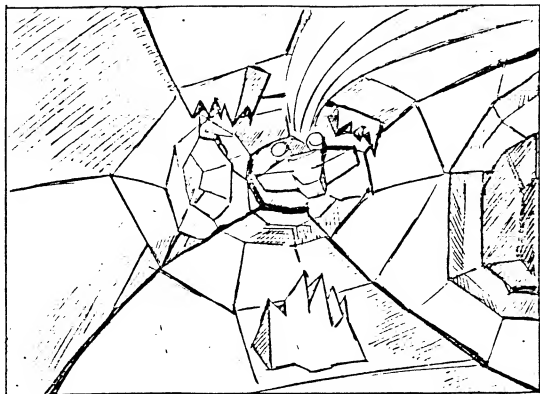
Once in the cave, the enemy you are following stays just out of range. Other enemy fighters are hidden inside caves; you try to hit them as you pass. If you miss, you will get an "Enemy behind you" message and have to turn the GUNSTAR chair around to hit it. Otherwise you will take fire from behind. If you remain turned around, the fighter you were following will turn and attack until you turn back--then it will speed off again.



LAST STARFIGHTER

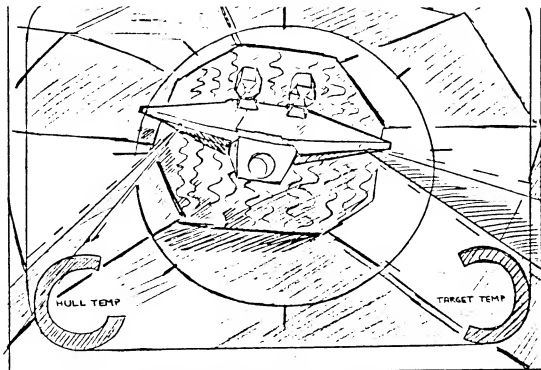
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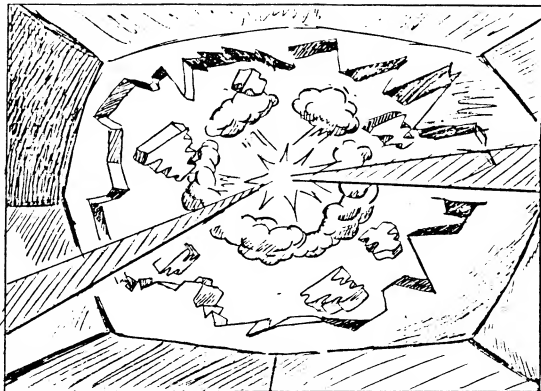
chase fighters through tunnel

If you remain alive long enough, you come to the end of the passage and your chair is turned to front. The fighter has turned and is firing at you.



xurian fighter is cornered .

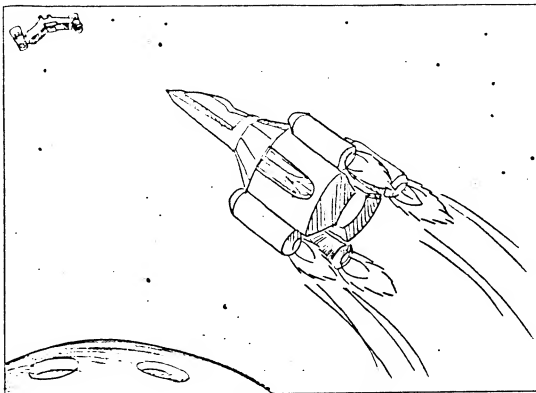
You cannot stop and must heat up and destroy the highlighted end wall before you hit it. You get a large bonus for also hitting the fighter. If you pass through intact barrier, the hull temperature increases, possibly killing you if you were already hot.



blast through force barrier

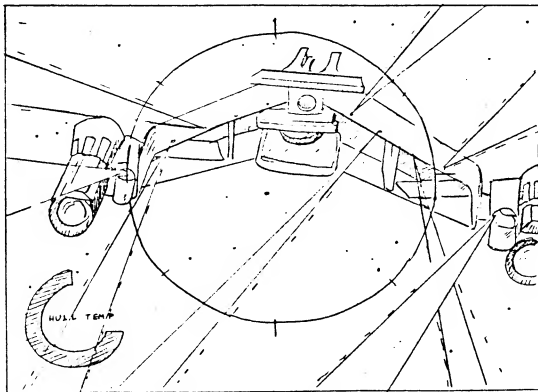
Successful completion of the cave round requires the use of the enemy position globe and GUNSTAR orientation indicator already discussed. Movement of the GUNSTAR chair is rapid and jerky--unlike cursor movement which is smooth--giving a similar feel to the Star Wars moving seat. Chair movement occurs when cursor is moved just outside aiming circle. Chair is somewhat magnetic in this mode to the forward and backward positions. In this mode there is a feeling of high speed in enclosed space and this should lead to an adrenalin reaction during the end sequence (hurtling towards wall).

After cave you see a removed (pull back) picture of GUNSTAR heading for control ship.



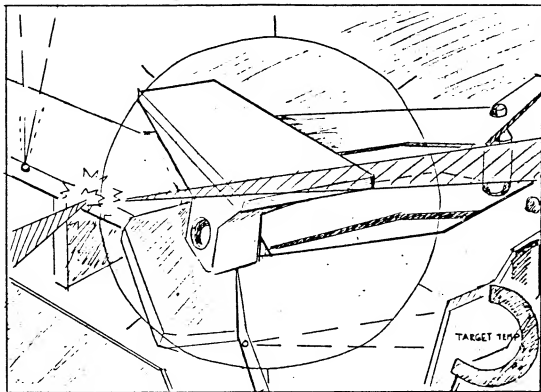
toward command ship

Starfighter does straffing run past command ship which is firing at you.  
Hit emplacement to stop incoming laser fire.



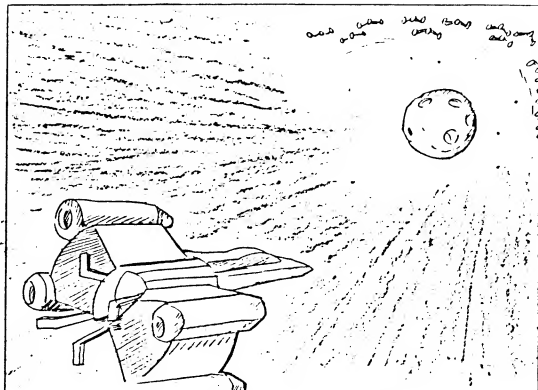
all guns blazing

As you get close, keep chair pointing at target. Try to destroy highlighted control tower for large bonus.



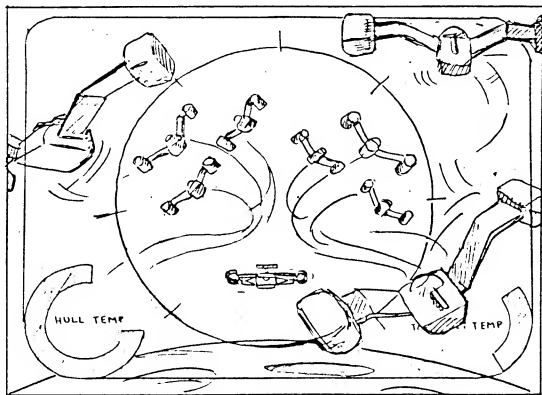
shoot enemy guns - hit turret for big bonus

You pass command ship and see it receding fast in the distance, until very small.



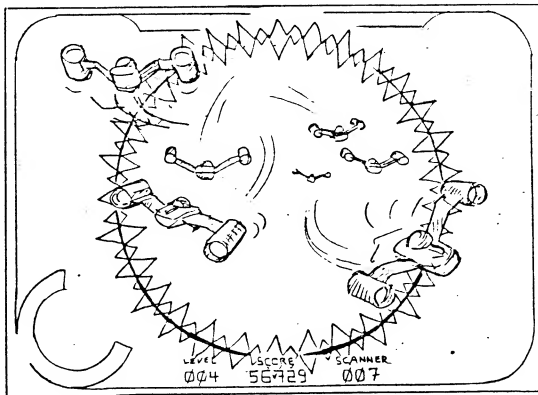
deck fighters are waiting

Clouds of enemy deck fighters pass it heading towards you in formations and firing.

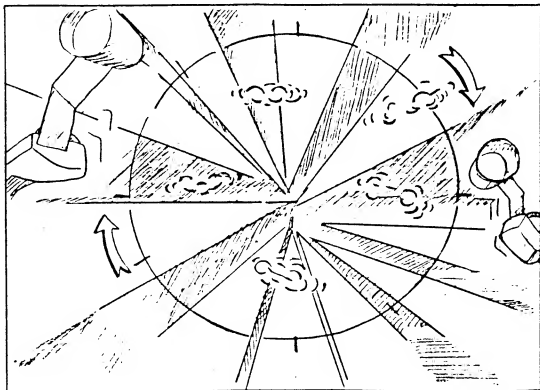


fighters fly in formation

Hit all you can with lasers, but try to get major concentration with death blossom.

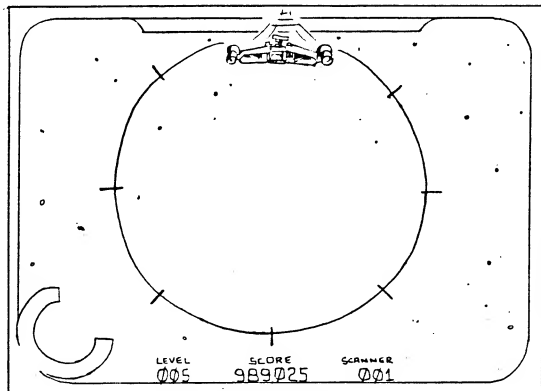


! death blossom activated!



ZZZZZZZ a p p p p!

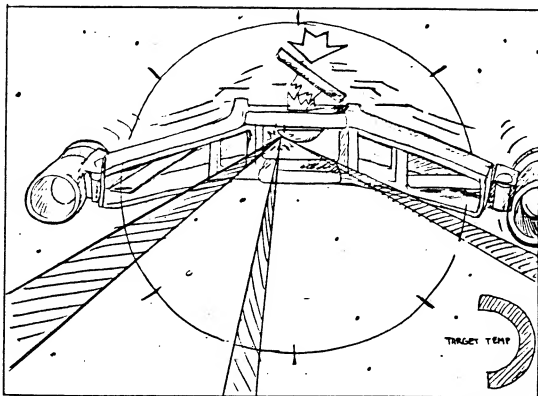
Fighters execute formation evasive maneuvers and you must move very fast to hit them.



the showdown

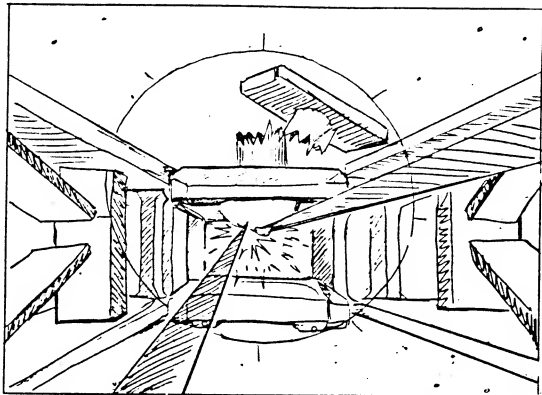
After final and hardest wave is destroyed, you see the command ship approaching from center screen, slowly getting larger, then faster and faster until it dominates screen. You must raise its target temperature by constantly hitting its command area (highlighted). The command ship moves on screen as it approaches, making it hard to concentrate your fire on one area. If you divert and fire, it starts to cool off.





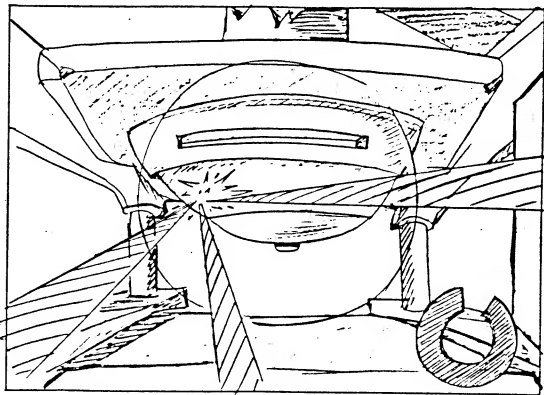
crippled command ship tries to ram you...

Before exploding, a pod ejects from the command ship to the words, "XURIS ESCAPING, HE HAS TAKEN A POD". Diverting fire allows command ship to cool slightly, perhaps allowing it to ram you, but hitting pod gives a very large bonus. The more accurately you have been hitting the command ship, the more time you have to hit XUR's pod and still destroy command ship before impact. There is a verbal countdown to impact.

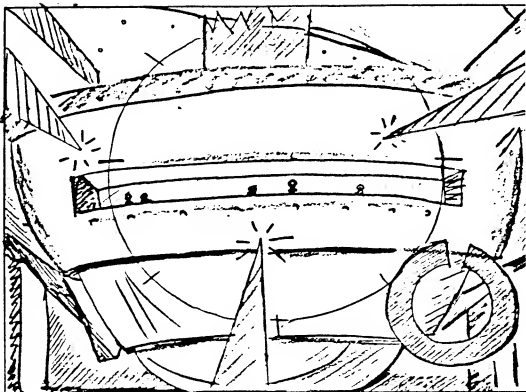


will she blow in time?

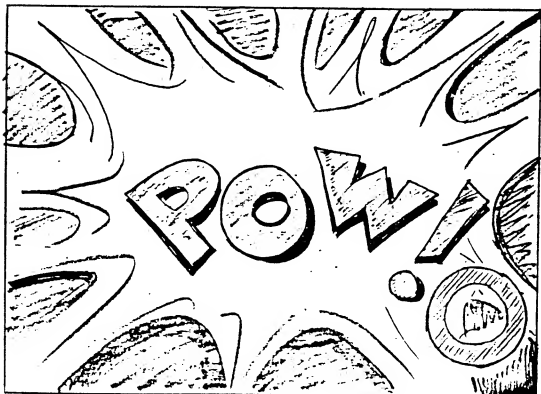
The command ship moves faster on higher levels.



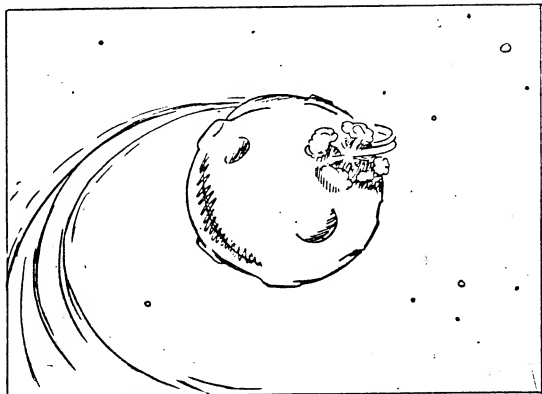
closer and closer



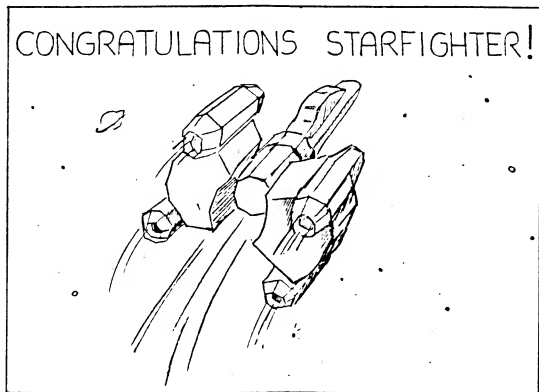
only moments left



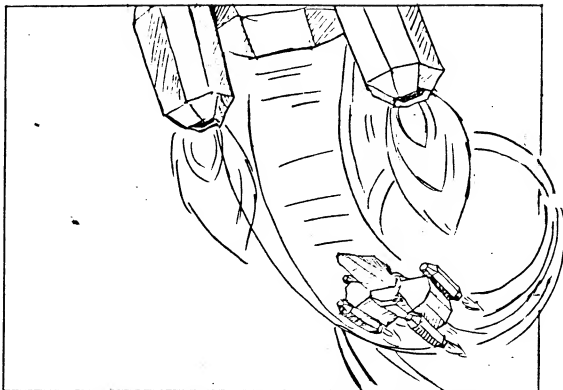
When command ship explodes, pan back to see...



Coolant recharge. command ship crashes into moon



Points awarded.



barrel roll , loop the loop , and out !

Start next round.

IF YOU MISS....

Command ship hits causing increased hull temperature, but it is not destroyed. You turn (if still alive) and see it slow down. Then turn to repeat ramming procedure. (No pod this time.)

Repeats until you destroy it or die.

End sequence if you die--screen melts, flames on screen, explosions, black.

5. CONTROLS

Star Wars' controller or other pointing type (analog) with thumb and finger triggers. Cursor responds to controls similar to Star Wars, with view change when cursor hits periphery of aiming airicle (gunstar chair moves). Lasers fire with either front button, choice of firing multiple lasers simultaneously to destroy target quicker (with corresponding decrease in decrease of energy).

6. DISPLAY TYPE

- . Medium resolution raster
- . High quality color/contrast.

7. PROJECT TEAM

Project Leader - Chris J. Horseman  
Project Engineer (Software) - Jim Morris  
(2nd Project Engineer (Software)) - Jack Ritter  
Animator - Barry Whitebook

Cost Estimate

LAST STARFIGHTER

MATERIAL COST

Display . . . . .	\$ 220.00
Switcher PCB . . . . .	80.00
Game PCBs . . . . .	1,570.00
Card Cage . . . . .	30.00
Coin Door . . . . .	44.00
Coin Door Enclosure . . . . .	11.00
Cash Box . . . . .	3.00
Switch bracket Assembly Components . . . . .	16.00
Harness, Main, AC, PWR . . . . .	35.00
Harness, Control Panel . . . . .	6.00
Wood Cabinet Components . . . . .	43.00
Power Supply and Cord . . . . .	40.00
Control Panel/Decal . . . . .	11.00
Control Mechanisms . . . . .	82.00
Speakers and Grills . . . . .	20.00
Glass and Bezels . . . . .	15.00
Flourescent Light . . . . .	5.00
Labels and Manuals . . . . .	3.50
Formed Parts . . . . .	12.00
Shipping Container . . . . .	14.00
Other (fan, etc.) . . . . .	10.00

MATERIAL TOTAL	\$2,270.50
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LABOR COST

PCB Labor . . . . .	30.00
Silkscreen . . . . .	2.00
Wood Shop . . . . .	21.00
Video Sub-Assembly . . . . .	7.00
Video Final Assembly . . . . .	7.00

LABOR TOTAL	67.00
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PRIME COST (MATERIAL & LABOR)

UPRIGHT . . . . .	\$2,337.50
SIT DOWN . . . . .	2,487.50

PCB COST

Main Board . . . . .	\$ 336.00
Buffer Board (2 @ \$185) . . . . .	370.00
Buffer Board (1 @ \$120) . . . . .	120.00
Applications Module . . . . .	249.00
Amplifier Board . . . . .	20.00
Polygon, etc. . . . .	60.00
Buffer PCs (4 layer) . . . . .	135.00
Processor Board (4 layer) . . . . .	90.00
Applications and Math Box PC (4 layer) . . . . .	90.00
PCB TOTAL	<u>\$1,470.00</u>
Math Box Additional	<u>100.00</u>
TOTAL	<u>\$1,570.00</u>



LAST STARFIGHTER

PROJECT GOAL FOR FIRST ENGINEERING REVIEW

First sequence of gunstar taking off, as in the film. This will demonstrate real-time rotation at one of the most detailed ships and will demonstrate the capability of the hardware to do the job. This sequence will be the attract mode and opening sequence of the game, and will be the most detailed of all the sequences.

This should be completed by 8 March 84, subject to getting the polygon fill and Vector draw hardware from Ted Michon by 1 February.

LAST STARFIGHTER

Project Development Status

Date: 1/30/84  
Project Leader: C. Horseman  
Project Start: 1/84  
Lab: Advanced Games  
Extension: 7216  
Project #: TBA

Project Start: 1/84  
1st Engineering Review: 8 March 84  
1st Marketing Review: 8 March 84

To be shown at 8 March reviews: attract mode sequence (GUNSTAR taking off).

2nd Engineering Review: 8 June 84  
2nd Marketing Review: 8 June 84

To be shown at 8 June reviews: all segments demonstrable but not finished. Not all interludes complete.

Because of the lack of control we have over hardware development, I feel we are unable to schedule further than this at this time. However, by 8 March (first reviews) we will be able to submit full project and production schedules.

We are tentatively predicting software completion for July/August '84.

RECEIVED

JAN 17 1984

C.J. HORSEMAN

MERCHANDISING CORPORATION OF AMERICA, INC.,

100 UNIVERSAL CITY PLAZA, UNIVERSAL CITY, CALIFORNIA 91608, 213-985-4321

January 12, 1984

Mr. Chris Horseman  
ATARI Incorporated  
60 East Plumeria Drive  
P. O. Box 50047  
San Jose, California 95150

Re: THE LAST STARFIGHTER

Dear Chris:

To confirm our telephone conversation, the design specification and project initiation data on THE LAST STARFIGHTER you submitted December 22, 1983 to both Lorimar and Universal is approved without change. We are all very pleased at this preliminary stage with your proposal which we feel has so far effectively captured the essence of the film.

For your information, the special effects sequences showing the major battles and traveling inside the asteroids will probably not be ready for viewing until March. I will keep you posted as more specific dates become available.

I look forward to receiving the next stages of development for approval.

Regards,



Nancy Cushing-Joens  
Vice President

NCJ:pao

cc: Jim Fiedler

### Overview of Features

System IV highlights are listed below:

- 512 wide by 384 high pixel display area
- 4 to 8 bits per pixel in each of 2, 3, or 4 Buffers
- 16 MHz pixel display rate
- 24 KHz horizontal sweep rate
- 60 Hz vertical display rate
- Up to 256 colors using 1 Buffer plus 255 additional colors per additional Buffer
- Up to 16,777,216 selection color palette
- Independent scroll offsets for each line of each Buffer along each axis
- Screen Memory surrounded by unused Screen Space for fast clipping
- 16 MHz vector functions
  - Point plot
  - Vector plot
  - Polygon fill
- 16 MHz character features
  - 1 megabyte stored Image Memory
  - Rectangular input windowing
  - Clipping to visible Screen Memory limits
  - Selectable X and/or Y reversal
  - Selectable X/Y transposition
  - Screen to screen transfers
  - Fractional zoom option
- Real-time Screen Memory processing during display
  - Time transparent operation
  - General erase
  - Selective erase
  - Image compression and/or restructure
  - Inter/intra buffer merge and copy
- 8 MHz 68000 CPU
- Standard speed 64K dynamic RAMs
- Multi-sourced TTL and NMOS construction
- External direct digital video input to Color Memory palette
- Copyrightable microcode and read-fuse protected PALs

## Specifications

### CPU Space Allocation

Application Module Program Memory space	1 megabyte
Application Module expansion memory space	3 megabyte
Application Module Scratchpad Memory Space	1 megabyte
Application Module IO space	1 megabyte
Debug Module monitor space	1 megabyte
Debug Module image emulation space	1 megabyte
Processor Module Image Memory space	1 megabyte
Processor Module Queue Memory space	4 to 16 K words
Processor Module Control Registers	23

### Speed

Data transfer	16 million pixels per second
Erase	16 million pixels per second
Queue Controller Instruction Fetch	8 MHz
CPU	8 MHz

### Buffers

Buffers per system	1 to 4 maximum
Bits per pixel	4 to 8 maximum
Buffer horizontal offset range	0 to 511, wrapped
Buffer vertical offset range	0 to 511, wrapped
Visible Screen Memory size	512 x 384
Physical Screen Memory size	512 x 512
Screen Space size	4096 by 1536
Replacement Table size	256 x 8
Horizontal Offset Table size	384 x 9
Vertical Offset Table size	384 x 9

### Color Output

Color levels	256 per primary color
Color Table size	256 x 8
Color Tables	4 per primary color

### Wait Status

Queue Memory, Control Register	0
Control Register Read	1?
Screen Memory Direct Read	?
Screen Memory Direct Write	?
Program Memory	0 or more

Display Monitor

Timing:

	current	original	unit
master clock	32.00	32.00	MHz
pixel			
frequency	16.0	16.0	MHz
period	62.5	62.5	us
horizontal			
sweep			
frequency	24.2	24.0	KHz
time	41.25	41.6	us
pixels	660	666	pixels
non-blanking			
time	32.0	32.0	us
pixels	512	512	pixels
retrace			
time	9.25	9.63	us
pixels	148	154	pixels
vertical			
sweep			
frequency	60.0	60.1	Hz
period	16.7	16.7	ms
pixels	266664	266400	pixels
lines	404	400	lines
non-blanking			
time	15.8	16.0	ms
pixels	253440	255744	pixels
lines	384	384	lines
retrace			
time	825	666	us
pixels	13200	10656	pixels
lines	20	16	lines

input levels

H sync	TTL
V sync	TTL
R,G,B	any linear subrange within 0 to 5 volts

(NOTE: See Don Paauf for complete spec.)